Rain height information from TRMM precipitation radar for satellite communication in Malaysia

Abstract

Tropical and equatorial region exhibits significantly higher rainfall rate with regard to temperate region leading to extreme attenuation for satellite communication links. One relevant issue for radiowave propagation modeling in this particular region is the different structures of precipitation which play an important role in estimating rain fade. To this aim, an investigation of the rain characteristics of 0°C isotherm height in Malaysia derived from the precipitation radar on-board the TRMM (Tropical Rainfall Measuring Mission) satellite has been carried out. In fact, TRMM satellite precipitation radar appears as one of the powerful source of instrument in meteorology and telecommunication in estimating height of rainfall in tropical/equatorial region. In this work, one year of TRMM radar data have been analyzed from the stratiform rain event which there usually exists a well defined melting layer (or bright band). These results are then compared with the radiosonde measurement and ground meteorological radar obtained from earlier publication, together with the mean 0°C isotherm height given in the ITU-R Recommendation P.839. Comparisons show that the freezing heights typically occurred at the height higher than 4.5 km as recommended by ITU-R Recommendation P.839. The preliminary results suggest that by carefully consider the physical information of rain height derived from the various local databases should lead to substantial improvements in the rain attenuation prediction accuracy for equatorial and tropical region